DOCUMENT RESUME

ED 065 847 CS 000 101

AUTHOR Chester, Robert Davis

TITLE Differences in Learnability of Content and Function Words Presented in Isolation and Oral Context When Taught to High and Low Socio-Economic Level Subjects.

PUB DATE Apr 72

NOTE 19p.; Paper presented at the Annual Meeting of the American Educational Research Assn. (Chicago, April 1972)

EDRS PRICE MF-$0.65 HC-$3.29

DESCRIPTORS Aural Learning; *Beginning Reading; Context Clues; Function Words; Grade 1; *Learning Modalities; *Learning Processes; Oral Communication; *Reading Research; Reading Skills; Semantics; *Socioeconomic Influences

ABSTRACT

The purpose of this investigation was to gather empirical data concerning the learnability of content and function words taught in treatments of isolation and oral context to groups of prereading first grade pupils in high and low socio-economic levels. One hundred twelve subjects were tested through a paired-associate task and the data were analyzed in a 2 X 2 X 2 analysis of covariance. Of the main effects--word class, treatment, and socio-economic level--only the latter two were significant. Results indicate that socio-economic level and context may be important factors in initial learning. (Author)

ED 065847

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Robert Davis Chester
Wisconsin R & D Center
University of Wisconsin
1404 Regent Street
Madison, Wisconsin 53706

Differences in Learnability of Content and Function Words Presented in Isolation and Oral Context When Taught to High and Low Socio-Economic Level Subjects

Abstract

The purpose of this investigation was to gather empirical data concerning the learnability of content and function words taught in treatments of isolation and oral context to groups of prereading first grade pupils in high and low socio-economic levels. One hundred twelve subjects were tested through a paired-associate task and the data were analyzed in a 2 X 2 X 2 analysis of covariance. Of the main effects--word class, treatment, and socio-economic level--only the latter two were significant. Results indicate that socio-economic level and context may be important factors in initial learning.

The purpose of this investigation was to gather empirical data concerning the learnability of content and function words taught in treatments of isolation and oral context to groups of prereading first grade pupils in high and low socio-economic levels. Although the dichotomy between content and function words has been demonstrated by a number of experimenters, many word lists and materials for beginning readers have failed to take note of it. A review of the literature indicates that most educators advocate teaching words in context rather than in isolation. However, there is little empirical data to support this theory. Concerning the influence of socio-economic level on reading achievement, most research seems to indicate that there is a significant relationship between low socio-economic level and reading disability.

The learnability construct used in this study was derived from Coleman (1970). He has shown that frequency of occurrence of words in the language

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is poorly correlated with what he calls the "learnability" of words when learners are first grade children who are prereaders. In his research, he has discovered that there are individual characteristics within printed words which make them easier or harder to learn than other words. Although these characteristics have not all been properly defined, they do seem to be present. Thus some words are more learnable than others in that their mastery is more easily accomplished by beginning readers. Coleman obtained a learnability measure by using as stimuli the 500 most common words in English according to the Lorge magazine count and the Lorge-Thorndike semantic count. The learnability scale was based on the mean number of misses in individual teaching-testing treatments: the more difficult the word, the greater number of misses in learning to recognize and respond correctly to it. Although he made a number of important discoveries in his study, by far the most important one was that there is a statistically significant difference between easier and harder words, and this difference has little to do with the frequency of the appearance of those words in the language.

A similar study by H. Jones (1968) revealed the same low correlation between frequency and learnability. Bickley (1969), as part of his dissertation, did a cross validation of Coleman's correlation with the same result. Battig (1957), using college students as subjects, found that there is little or no evidence for relating learning to word frequency.

The fact that there are levels of learnability and that they are not necessarily associated with frequency should come as no surprise. Linguists have been affirming in the last few years that the printed language is a secondary language system built upon the primary language, which is oral (Carroll, 1964). Unfortunately, this concept has not been applied in most of the reading word lists of the past. Three notable examples of this are the Thorndike list (1944), the Dolch list (1936), and the Rinsland list (1945).

The theory of learnability has been substantiated in studies involving concepts other than words. Using a paired-associate task, Bridge (1968) performed an experiment that rank-ordered 35 letters and letter combinations according to the ease with which children learn their sounds. Laumbach (1968) rank ordered 293 two-sound words according to their phonic blendability and found that major differences, some as high as ten to one, existed in the different phoneme combinations. Coleman (1970) replicated the Laumbach study and verified her findings. He suggested that the results of these studies are applicable to most children. A. Jones (1968) reported an investigation in which she rank-ordered the lower-case letters according to ease of printing. From the results of this study, she was able to generate tables and learning curves for the three most common errors for the letters of the alphabet.

In light of these and similar investigations, it is imperative that vocabularies for beginning readers take into consideration the concept of learnability. It seems apparent now that rank-orderings of various information and concepts can be devised which may aid beginning readers.

The learnability construct appeared to be applicable to content and function words. Although learnability has been applied to a number of other concepts, no one has yet applied it to this aspect of linguistic structure. The review of the literature revealed unique basic differences inherent in each of the two word classes. As was also noted in the literature, function words are generally acknowledged to be more difficult to learn than are content words. However, this generalization rested mainly on the basis of speculation since there was not empirical evidence to confirm this theory. Nevertheless, Jefferson (1969) has pointed out that content and function words are "clozed" differently, Weaver (1964) has suggested that they are categorized differently within the cognitive structure, and Jones and Wepman (1961) have identified them separately in certain types of aphasics.

McCarthy (1930) reported that content words comprise approximately 70 percent of the speech of the 18-month-old child, with nouns making up 47 percent of the total number of responses. By the time a child reaches the fifth grade, his knowledge of function words approximates that of an adult while this is not true for content words (Carterette, 1963). Since evidence pointed to differences in the two word classes, and since empirical evidence had not been gathered to substantiate this, the study of this problem seemed legitimate.

Research literature also indicated that the consideration of socio-economic levels in studying the problem of differences in function and content words is important. Evidence indicates that high and low socio-economic children have different vocabularies (Thomas, 1962) and different syntactical patterns (Patin, 1964). Consequently, one may expect differences to appear in the learning processes of the two levels of children.

There is conflict of opinion about teaching words in isolation or in context. In context there are obvious clues related to meaning and usage which are not available in isolation. However, if learning is merely the association of the graphic symbol with meaning already existent within the cognitive framework, context seems superfluous. In attempting to discover the best way to teach words, consideration of this problem seemed appropriate.

Since educators and researchers appeared to be divided on the question of sex as an influence on initial reading, it seemed worthwhile to consider this factor. However, preliminary investigation in the form of a pilot study revealed that this factor was not significant. Consequently, it was not included as a main effect.

It seemed unwise to leave so important a factor as intelligence to chance; therefore, it was held constant in the analysis of the data by the process of covariance.

The major objectives of this study were to answer the following questions:

1. For beginning first graders do function words differ in difficulty from content words?
2. Are function words and content words more difficult for beginning first graders when taught in isolation than when taught in context?
3. Are function and content words more difficult for low socio-economic beginning first graders than for high socio-economic first graders, regardless of whether taught in isolation or in in context?
4. Can any differences in learnability be attributed to first or second order interactions between main effects?

For purposes of measurement, these objectives were translated into null hypotheses.

Method

Subjects. From the total first grade population of three DeKalb County, Georgia public schools, all students were selected who might be classified as either high or low socio-economic subjects by a modification of the occupational scale of The Hollingshead Two-Factor Index of Social Position. Fifty-six subjects plus four replacements were drawn from the low socio-economic pool and randomly assigned to the four treatments for low socio-economic level pupils. Similarly, 56 subjects, plus four replacements were drawn from the high socio-economic pool and appropriately assigned. Each of the eight cells in the experiment contained 14 subjects plus one replacement. The four treatments administered were: 1) content words in context, 2) content words in isolation, 3) function words in context, and 4) function words in isolation. Treatments for low and high socio-economic level subjects were identical

Materials. Using as a base the first 125 words from Coleman's (1970) rank ordering of words as to ease of look-and-say learning, a pilot study was undertaken to determine which, if any, of the words could be recognized by children entering first grade for the first time. By this method twelve words were eliminated. From the remaining 113 words, five function words and five content words were randomly selected to be used in the experiment. Each of the ten words was printed on a separate card and the cards were divided into sets of either five content words or five function words. Twenty-one sets of each word class were prepared. The five words within each set were randomly arranged and the sets within each word class were randomly ordered from 0 to 20.

Procedure. Treatments were carried out on an individual basis during the first week of school. Every attempt was made to establish proper rapport with the subjects before treatment was administered. The treatment itself followed the same format for both function and content words. The only differences imposed were the words themselves and, in the case of treatment in context, the context sentences. Treatments were predetermined, written down and followed exactly.

The treatment consisted of showing the subject the first word in set 0 of the appropriate word class, and of pronouncing the word for him. In the treatment in context, the tester provided a sentence using the word in oral context. He then elicited two responses from the child, using the format previously established for that treatment. In each treatment, isolation or context, the administrator pronounced the word three times and the child pronounced it twice. The examiner then moved on to the next word and continued until all five words in the teaching set had been shown.

After set 0 had been completed, the examiner selected the second set of cards, set 1, from the previously randomized and ordered sets. He presented the first word to the child and said, "Can you read this for me?" If he received a negative answer or if the child read the word incorrectly, the examiner marked an error on the treatment record sheet and repeated the proper teaching sequence identified with the particular word in the particular treatment. If the subject read the word correctly, the tester acknowledged the correct response by echoing it, repeated the word again (in or out of context, according to treatment) and asked the child to repeat the word a second time. This action was taken to help control the number of reinforcements.

The examiner then moved on to the second word and repeated the same procedure. This procedure was continued until the subject gave the first perfect set of responses duplicating the stimulus set or until he had worked with all the sets through 20. Learnability scores for any particular word for one subject could range from 0 to 20 according to the subject's performance. The score for any one subject on the set of five words presented from 1 to 20 times could range from 0 to 100.

Results and Discussion

The data were analyzed in a 2 X 2 X 2 (Table 4) analysis of covariance. The factorial design has a number of important advantages over a single-factor experiment. For instance, in this experiment, the full number of observations, that is, 112, entered into every comparison made, despite the fact that each treatment group consisted of only 14 observations. The design also has the added advantage of providing information about the interactions between factors as well as about the main effects of the three factors being examined. If the interactions involving a given factor are not significant, then one has a broader

basis for generalizing about the main effect of the factor, because it has been tested in conjunction with variations of other factors rather than holding the others constant at arbitrary levels. If, on the other hand, one has a significant interaction, examination of the nature of the interaction may provide additional insight as to how each factor operates (Edwards, 1968).

Through covariance, it was possible to hold the intelligence factor constant while examining the dependent variable, the total number of errors committed by each subject. Table 1 presents the mean intelligence scores for each cell. The adjusted mean scores for dependent variables are presented in Table 2. The adjusted mean for the dependent variables by cell is presented in Table 3.

Concerning the main effects (word class, treatment, and socio-economic level), only the latter two were significant at the .01 level. The possible interactions were (1) word class by treatment, (2) word class by socio-economic level, and (3) treatment by socio-economic level; however, none of these was significant at the .01 level.

The study failed to reject the first null hypothesis, that for beginning first graders there is no statistically significant difference in learnability of function and content words. Despite the fact that the two word classes are "clozed" differently (Jefferson, 1969), categorized differently within the cognitive structure (Weaver, 1964), and identified separately in certain types of aphasics (Jones and Wepman, 1961); and although their grammatical and linguistic functions are quite different (Hockett, 1958), this dichotomy apparently does not extend into the experience of learnability. The adjusted mean for function words (28.10) was higher than the adjusted mean for content words (22.99), indicating that there was a greater number of errors associated with learning the function words. However, the difference was not statistically

Table 1

Mean Intelligence Scores by Cell

	High Socio-economic Level		Low Socio-economic Level	
	Content Words	Function Words	Content Words	Function Words
Context Treatment	108	110	96	94
Isolation Treatment	110	110	96	91

Table 2

Adjusted Mean Scores for Dependent Variables

Socio-economic Level	Adjusted Mean Score
High Socio-economic Level	14.95
Low Socio-economic Level	36.14
Word Class	
Function Words	28.10
Content Words	22.99
Treatment	
Treatment in Isolation	30.55
Treatment in Oral Context	20.54

Table 3

Adjusted Mean Scores for Dependent Variable by Cell

	High Socio-economic Level		Low Socio-economic Level	
	Content Words	Function Words	Content Words	Function Words
Context Treatment	5.88	12.93	30.85	32.50
Isolation Treatment	16.20	24.76	39.02	42.19

Table 4

Main Effects and Interactions of Socio-economic Level, Word Class, and Treatment

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F
Word Class	1	726.2042	726.2042	2.36
Treatment	1	2801.1055	2801.1055	9.08**
Socio-economic Lev.	1	8342.7827	8342.7827	27.05**
WC X TR	1	50.2642	50.2642	0.16
WC X SE	1	201.4644	201.4644	0.65
TR X SE	1	32.0750	32.0750	0.10
WC X TR X SE	1	9.6775	9.6775	0.03
Error	103	31765.9430	308.4072	

**Significant at the .01 level

significant at the .01 level (Table 2).

This study seems to verify Coleman's finding that the words in his learnability list are arranged by order of difficulty for subjects who are first grade prereaders. A "t" test that was performed at the time of their selection indicated that the content words and the function words selected from the Coleman list were not significantly different according to his criterion measures.

The second hypothesis, that for beginning first graders there is no statistically significant difference in learnability of stimulus words in oral context and in isolation treatments, was rejected. With 1 and 103 degrees of freedom, an F of 6.90 must be reached in order for the null hypothesis to be rejected at the .01 level. As indicated in Table 4, the F of 9.08 is significant. The learnability scores for stimulus words in oral context treatments were significantly lower than the learnability scores for stimulus words in isolation treatment.

This result was anticipated on the basis of the literature. Staats (1968), for example suggests that oral context not only offers the subject an opportunity to relate the new word to previous experiences, but it also provides reinforcement through various types of word association patterns previously established within the cognitive structure. Lambert (1970) likewise found this to be true in working with 245 first grade pupils.

Lefevre (1964) further elaborates on the importance of context by indicating that all new words should be introduced in a context which consists of a meaning-bearing sentence spoken to provide intonation, word order, and grammatical inflection. The findings of the study seem to bear out Lefevre's theory. All of the words in context treatments were taught in the context of simple sentences, providing the subject with opportunities to use clues of intonation, word order, and grammatical inflection. Careful

attention was also given to providing subjects with opportunities to call on their experiential background and probable oral vocabularies.

The third hypothesis, that for beginning first graders there is no statistically significant difference in learnability of stimulus words by high and low socio-economic level subjects, was rejected. In order to reject the null hypothesis at the .01 level, it was necessary to obtain an F of 6.90 with 1 and 103 degrees of freedom. The F of 27.05 given in Table 6 was more than adequate for this purpose. The learnability scores of high socio-economic status subjects were significantly lower than the scores of the low socio-economic subjects.

As indicated in Table 2, the actual difference in adjusted mean scores between the two groups was more than 20 points, the high socio-economic group averaging 36.14 and the low, 14.95. It is also noteworthy that of the two groups, only three of the high socio-economic subjects failed to master the task (give a perfect set of responses duplicating the stimulus words) whereas 22 of the low socio-economic students failed to do so (Table 5).

The rejection of the third null hypothesis was also anticipated. It was obvious to the examiners, all of whom were qualified to make such judgments, that many of the children in the low socio-economic treatments did not possess basic readiness skills necessary for learning to read. As a group, these pupils were less verbal than their high socio-economic counterparts. The low socio-economic subjects were also less confident and more reluctant to guess than were the high socio-economic subjects. Their lack of attentiveness to the task was accompanied by restlessness and forgetfulness. In fact, in many ways they exhibited the characteristics of what Berieter (1965) calls the culturally deprived child. Berieter states that:

Table 5

Total Number of Students Who Mastered or Failed to Master Learning Sets, Arranged By Word Class, Treatment and Socio-economic Level

	Mastered	Failed to Master
Word Class		
Function Words	43	13
Content Words	44	12
Treatment		
Isolation	40	16
Oral Context	47	9
Socio-economic Level		
High	53	3
Low	34	22

> ...culturally deprived children do not just think at an immature level; many of them do not think at all. That is they do not show any of the mediating processes which we ordinarily identify with thinking. They cannot hold onto questions while searching for an answer. They can not compare perceptions in any reliable fashion. (p.17)

On the other hand, the high socio-economic subjects were not only ready to learn; most of them were eager. During the period set aside for establishing rapport, these students were quite verbal and often led the conversation. Their sentence structure was generally well ordered and at times quite sophisticated. Most of them exhibited self confidence, and once the task was begun, they were rarely distracted. They appeared to understand what was expected of them, and most of them cooperated enthusiastically.

The rejection of the third null hypothesis might also have been expected on the basis of the literature. For instance, Patin's research (1964) concerning the "public language" of the underprivileged child and his lack of a "formal language" seems especially relevant in view of the findings of this study. The fact that low socio-economic pupils are likely to be limited to a "public language" adequate only for conveying simple items of information, making requests, or indicating agreement or disagreement seems indicative of a more basic problem. Most of these children lack culturally adequate background or wide language experience. In addition, Thomas (1962) has shown that many of them do not use the same vocabulary or language patterns as do middle and upper class children.

None of the first or second order interactions was significant, therefore, the study failed to reject hypotheses four, five, six, and seven.

On the basis of the data gathered in this experiment, it appears that, at least for this population, no difference existed between the ease with which subjects learned content words and the ease with which they learned

function words. This is contrary to the findings of those studies which have indicated that the two word classes are "clozed" differently, categorized separately within the cognitive structure, identified separately in certain types of aphasics, and generally dichotomized as separate word classes. However, the difference may lie in the fact that all of the other studies used older subjects. It is also quite probable that the differences between the S-R task and those used in various other experiments may have contributed to differences in results.

Another important finding revealed by this experiment was that the pre-reading first grade subjects in both socio-economic levels learned both word classes with significantly less difficulty when stimulus words were presented in oral context than when the words were represented in isolation. Generally when educators have stressed teaching words in context, they have meant written context. Data from this study seems to indicate that oral context can be considered an equally important factor in initial learning.

One further important finding was that low socio-economic subjects scored significantly poorer on the S-R task than did high socio-economic subjects. This was reflected in both the analysis of the data and in the fact that almost 20% of the low socio-economic subjects failed to complete the task. It appears that there are socio-economic differences which must be accounted for in initial learning. Although generalization on the basis of one study with a limited population is unwise, the results of this experiment seem to justify further investigation into such areas as "Learnability", the influence of socio-economic level on learning, and the use of oral context in initial learning.

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